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ABSTRACT

The latest development to come out of ongoing research at Tate Modern, London's new museum of modern art, is i-Map art resources for blind and partially sighted people that are delivered online. Currently i-Map explores the work of Matisse and Picasso, their innovations, influences and personal motivations, as well as key concepts in modern art. Aimed at partially sighted and blind people with a general interest in art as well as art teachers and their visually impaired pupils, i-Map incorporates text, image enhancement and deconstruction, animation and raised images. Importantly, i-Map transformed a gallery-based practice that involved intensive 1:1 delivery, into an entirely new way of deconstructing art online and one where the user has the necessary tools to work independently. i-Map goes beyond straight description, attempting to simulate purely visual experiences and the usual focus on "what?" in favor of exploring the "why?" of art so that visually impaired users can make their own critical judgments. The process of reassessing the parameters and definitions of art education for visually impaired people revealed the Web to be an ideal vehicle for increasing intellectual access and delivering effective interpretation in a format that offers autonomy of exploration. However, in order for a project such as i-Map to confidently defy received Web design wisdom and develop tailor made solutions, its content needs to be the product of successful methodology and focused research. It is possible to provide blind and partially sighed people with intellectual access to any artwork and the Web offers enormous potential to do assist in this process. In attempting to achieve this, i-Map can provide useful practical and pedagogical pointers. (Author/AEF)

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ED 482 124

Re-Assessing Practice: Visual Art, Visually Impaired People And The Web

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http://www.tate.org.uk/imap/

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Abstract

Interpretation for visually impaired people in art museums is dominated by an emphasis on the tactile and the physically immediate. In practice, this seemingly logical approach often keeps blind and partially sighted people at an intellectual distance from art works and their artistic context. For over-reliance on a tactile approach has the effect of making sculpture the primary vehicle for accessing art, despite the fact that "touchable" sculpture represents only a tiny fraction of Western art as represented in museums and galleries. Moreover, in this display context "touchable", by definition, means robust, indicating traditional materials such as bronze and stone. Yet like traditional narrative and figurative subject matter, bronze and stone cease to hold sway in twentieth century art. How then can someone who is congenitally blind be given intellectual access to non-tactile artworks that are not artefacts, that do not have clear descriptive relationships to objects and experiences from the lived world and that refer to and are of an about themselves only?

This was the starting point for research that began four years ago at Tate Modern, London's new national museum of modern art. The latest development to come out of this on-going research is i-Map art resources for blind and partially sighted people that are delivered online. Currently i-Map explores the work of Matisse and Picasso, their innovations, influences and personal motivations, as well as key concepts in modern art. Aimed at partially sighted and blind people with a general interest in art as well as art teachers and their visually impaired pupils, i-Map incorporates text, image enhancement and deconstruction, animation and raised images. Importantly, i-Map transformed a gallery-based practice that involved intensive 1:1 delivery, into an entirely new way of deconstructing art online and one where the user has the necessary tools to work independently. Moreover, i-Map goes beyond straight description, attempts to simulate purely visual experiences and the usual focus on "what?" in favour of exploring the "why?" of art so that visually impaired users can make their own critical judgments.

Visually impaired people use the Web in conjunction with screen reader software to obtain information, visually impaired people often find travel complicated and stressful, visually impaired children are usually in mainstream education and all schools in the UK are online. The process of reassessing the parameters and definitions of art education for visually impaired people revealed the Web to be an ideal vehicle for increasing intellectual access and delivering effective interpretation in a format that offers autonomy of exploration. However, in order for a project such as i-Map to confidently defy received Web design wisdom and develop tailor made solutions, it's content needs to be the product of successful methodology and focussed research. It is possible to provide blind and partially sighed people with intellectual access to any artwork and the Web offers enormous potential to do assist in this process. In attempting to achieve this, i-Map can provide useful practical and pedagogical pointers.

Keywords: i-Map, Tate Modern, accessibility, visually impaired, interfaces

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Introduction

> 'I was born blind, as a child I had a little sight, enough to see light and dark and a few colours, though not enough to see pictures or perceive any kind of object other than its mass. Therefore, the concept of visual art is quite new to me and, although I've been through some of these descriptions a couple of times I don't think Io:'ve grasped some of the finer points as some of the ideas strike me as very visual. I hope to be able to appreciate these concepts more in future by thinking about them and talking to other people.'

> This was a comment emailed to us via i-Map's feedback form. i-Map is an online project designed to give blind and partially sighted people access to the work of Matisse and Picasso. What is striking about this person's comment is the familiarity of the response. How many of us have had exactly that reaction when looking at art, especially modern art? The feeling that you're missing the point, but the sense that thinking it over and talking to others will clarify things. For Caro Howell and Dan Porter , the creators i-Map, this comment (and others like it) also suggests that our ambitions for the project have been realised, namely that a blind person has independently engaged with and thought about visual art without having to physically touch it.

i-Map came about as a result of work done by Caro Howell at Tate Modern with visually impaired people. Tate Modern is the UK's national museum of modern art. It opened in 2000 and Caro was part of a small team who in 1997 began developing a pre-opening public programme for Tate Modern and post-opening exhibitions, displays, education and interpretation. Part of her brief was to consider issues of physical and intellectual access. From experience she knew that traditional gallery education programmes for visually impaired audiences were not going to succeed at the new museum since they focused on touch, either through the use of dedicated handling collections, or, more often, through the supervised handling of artworks considered suitable by conservation staff.

Tate Modern shows art from 1900 to the present day, so the number of robust sculptures suitable for handling and on display at any one time is very low. Moreover, the gallery is huge " the building is a former power station " and displays are shown over three floors. So cherry picking only 'touchable' artworks would turn a visit into a forced march. Of primary importance though, was the issue of intellectual access. How were visually impaired people to engage with and understand the radical developments that have taken place in Western art since 1900, if they were only ever to experience three dimensional works and then only in bronze and stone?

Project History

In 1999 Caro began working with a group of visually impaired adults who had different degrees of impairment and different experiences of art, to explore language as an interpretative tool. In addition to guided tours, Tate Modern was planning self-directed audio tours for visually impaired visitors and Caro was interested in exploring different approaches to audio description. Traditional methods used in the theatre are neutral and objective. This approach is suitable if audio description merely fills in the contextualising gaps around the actors' dialogue, but it's clearly unsuitable for describing even figurative art.

The group worked with sculptures that could be explored through touch, but with the aim of creating a blueprint for interpreting art that couldn't be touched. Since the group's day-to-day experience of touch was pragmatic (as it is for most visually impaired people), initially their automatic descriptive responses to tactile

sensations tended to be generalised and unimaginative " warm, rough, big etc. So creative writers and performance poets were brought in to help them experiment with different structures and methods of description. These writers enabled the group to explore language as they explored different tactile sensations, to think, feel and articulate creatively. The challenge that emerged was how to describe with accurate particularity. In other words, identify quintessential qualities in an artwork and articulate them in ways that conveyed their uniqueness, but also made sense to others. It was this process that revealed the power of simile and metaphor as tools for enabling a group of people with disparate visual and personal experiences to reach quickly a shared point of understanding about something they couldn't see. However, metaphors and similes are also tricky to control. Their power to tap into people's imagination is itself a liability, because if not chosen correctly, they take the mind off on erroneous tangents that run counter to the artist's intentions. For instance, describing the surface of a sculpture as like candyfloss " cotton candy " when the piece is about mankind's survival post World War II, European occupation and the holocaust is clearly not appropriate, even though in many respects the suggested candyfloss similie was logical.

So, rigorous thinking about language was one important result of the *Making Sense* project and this would provide useful guidance when it came to writing i-Map. Another revealing discovering was the ability of tactile stimuli to provide physical metaphors for an artwork's effect or an artist's intention. Sometimes, tactile sensations were found to be more revealingly than language in capturing the essence of an artwork. An example of this that always springs to mind is a silicone breast implant that is a handling object used to explore a particular painting by Salvador Dali. The implant manages to capture the painting's disturbing combination of attraction/repulsion, familiarity/surreality and in particular, the quality of the painting's central feature which is an entropic hunk of flesh that seems to simultaneously seep and yet hold its shape.

The linguistic and tactile findings of the *Making Sense* project led directly to the formulation of Tate Modern's touch tours and, in turn, the methodology and philosophy of the tours informed i-Map. The Collection displays at Tate Modern are displayed not chronologically, but thematically across four large suites of rooms. The themes are based on the traditional genre of art " history painting, the nude, landscape and still life. Any visitor to the gallery has to engage with this curatorial intervention, even if they engage with nothing else and Caro felt strongly that the same should be true for visually impaired visitors. So four touch tours were created, one for each of the suites. Each tour is designed to explore the theme as a whole, as well as engage with a particular aspect of that theme. For instance, the tour in the Still Life/Object/Real life suite explores still life painting as a genre, in addition to looking at the way artists' use of materials has changed since 1900. When this tour was created is was considered by many to be the most challenging, as it contained almost not art that could be touched and included work by Picasso and Duchamp, artists who had previously been considered too 'difficult' to study with visually impaired people. However, this tour has proved to be the most successful with visitors precisely because of its challenging content. Far from being obscure and meaningless, blind and partially sighted people find the visual complexity of Cubism, collage and ready-mades and the artists' engagement with the conventions of art fascinating. As one blind woman put it at the end of the tour, having at first stated that she didn't like modern art; 'This makes sense to me because I think conceptually too.' At the heart of Tate Modern's and i-Map's approach to working with visually impaired people is the belief that engaging with art is not simply a question of looking at it. If it was that simple, people wouldn't have a problem with modern art, many of us would be out of a job and we'd all switch off the radio or put down the phone every time someone started talking about something we couldn't see. Looking at art is a process that engages the intellect, the emotions, personal lived experience as well as a phenomenological sense of self in relation to the object. Of course ocular acuity is an integral part of engaging with visual art and lacking sight does have a profound impact on one's relationship to art, but blindness alone doesn't negate or preclude engagement. In fact the notion of the ideal eye is itself a flawed one. It is said that one in 20 men are colour blind, Monet was painting with cataracts and all those people who don't wear contact lenses or glasses, when was the last time you had your sight tested? Are you sure you're

seeing perfectly? In reality, a substantial proportion of visitors to our museums and galleries must, by the law of averages, not be seeing in physical terms what the artist saw, let alone the mediating curators and interpreters. So there's a case to argue that if visually impaired people can't look at art in public museums and galleries the fault lies with us, museum professionals, and our lack of commitment, imagination and ambition, not with the visitor. The the word 'look' is used deliberately, as it's used by visually impaired people, to mean to engage with and to understand.

The touch tours had revealed that no art was out of bounds, be it painting or video; installation or sculpture; figurative or abstract. More importantly, the traditional fixation with touch " 'if we can't touch it we can't use it' " was successfully challenged. After all, what would be the point of touching Duchamp's 'Fountain', which is a urinal when it's not the original urinal (that got lost and this is one of fifteen replicas), it's not in the original porcelain, but glazed earthenware painted to look like porcelain and more importantly, the work isn't about the urinal, but the nature of art and the role of the artist. Nevertheless, the numbers of visually impaired people visiting Tate Modern and having touch tours is small, perhaps one hundred and fifty a year. This is due in no small part to the logistical difficulties blind and partially sighted people face when planning a visit. Moreover, provision in art museums for visually impaired people has historically been poor, so there's not the expectation that a visit will be rewarding. So it takes a remarkable level of inquisitiveness for a visually impaired person with no previous relationship to art to decide to visit Tate Modern, on the off chance that contemporary art will be their thing. The challenge was therefore to find a way to bring the pedagogy of the touch tours to a wider visually impaired audience who may never come to the gallery. One group that was identified was visually impaired children. In the UK the majority of visually impaired children, if they have no other disabilities are in mainstream education. Many of them decide to study GCSE and A-Level art alongside their sighted classmates. However, they are taught by art teachers who have often little or no specialist training in teaching the curriculum to students with little or no useful sight. As a result, many visually impaired children end up being sidelined because they're set projects that bear no relation to the work their peers are undertaking, or that engage critically with the history of art. A graphic example of this was a GCSE class that was brought to the gallery by their teacher. The students were all coming to see examples of artists who use strong colour, as they were studying Fauvism. All that is except the one visually impaired student. She had lost her sight at the age of seven and had limited visual memory, so she was doing a project about dragons. The attitude towards this pupil was very much 'can you entertain her whilst the rest of the class studies the art.' It had clearly never occurred to the teacher that her pupil could be included in discussion about Fauvism or that she, like most visually impaired people including congenitally blind people have a sophisticated conceptual sense of colour.

Naturally, this lack of involvement at an early age will often lead to a complete alienation from the world of visual art. Perhaps the most telling comment we heard when testing i-Map came from a blind man who, after struggling to extract some meaning from a description of Matisse's Moroccans said, 'to be honest, I'm just not interested in art, I guess I've always thought it just wasn't for me.' Indeed, he seemed confused as to why we were even pursuing the project. Given that he had always felt vaguely excluded from art, and thus had no contextual framework through which to interpret it, this lack of engagement should not have come as a surprise. Yet the touch tours at Tate had proved that elsewhere, there were visually impaired people with a hunger to learn more. As Caro had found, these individuals often presented a different challenge. Keen to develop ways of understanding art for themselves, they would often arrive with ill informed or half-understood notions, overheard from sighted descriptions and knitted together with uncertainty. On one hand, expert accounts of artists and styles made no allowances for visual impairment, while on the other, the accounts of helpers, friends and family were usually non-expert. Either way, outside of specialist schemes such as touch tours, curiosity was most often repaid with a confused and distorted perspective on art. To help break this cycle, we were committed to producing informed professional explanations in deliberately inclusive, non-visual terms. But in addition to the visually impaired users themselves, i-Map clearly needed to educate those whose descriptions and definitions were so often relied

upon.

The Development of i-Map

To summarise then, the concept of i-Map was developed in the knowledge that a considered linguistic approach, complimented by ancillary tactile materials, could and had made conceptually and visually complex art accessible. Yet for i-Map, the touch tours were the starting point rather than the model. Touch tour users were rare cases, and arguably motivated as much out of curiosity for the touch tour process as for the art itself. As an online project, i-Map could reach a far wider audience. It would be easily available at home and in schools, removing the logistical burden of a gallery visit. And it would bypass the censorship of sighted people presuming visual art to be off limits to the visually impaired. While touch tours relied on interested parties to book an appointment, i-Map, it could be hoped, would awaken in visually impaired Web users an interest in art where none had previously existed. It was in no way a replacement for the touch tours. Indeed, as a Web site it would inevitably lack some of the most powerful elements of the Touch tour methodology; the dialogue, the instant response to questions, the guiding hand of a specialist to keep the inquiry focused and so on. i-Map would have to generate an entirely new set of learning tools, albeit tools with the pedagogical breakthroughs of the touch tours inherent in their design.

The 'Matisse Picasso' exhibition at Tate Modern offered a perfect launch pad for a pilot project. Not only did the show have huge, worldwide public interest, but it also featured two artists who had traditionally been both physically and conceptually out of bounds to visually impaired people. In promising to stimulate an engagement with Matisse and Picasso across the entire spectrum of visual impairment we were, in effect, promising intellectual access to concepts such as modernism and cubism, not only to the user who has limited useful sight but also to the user who has never seen: a user, potentially, who has no visual perception of colour whatsoever and no understanding how three-dimensionality might be represented on a flat surface. So even to suppose that it was merely Matisse and Picasso that needed elucidating was to jump the gun considerably. Many of our projected users would need an understanding of picture-making, let alone these relatively late developments in its evolution.

We began by identifying themes that would serve to unite pairs of artworks, one by each artist. Like the exhibition itself, these pairings would allow us to explore both the commonalities and the differences between the work of Matisse and Picasso. But under the generous umbrella headings of 'Primitivism', 'Space' and 'the Nude' we could also begin to build up a broad sense of the techniques, traditions and ideas that are crucial to the interpretation of any modern artwork, and especially so when providing the user with a frame of reference from scratch. To these three headings we would also add 'Cut-Outs.' Though perhaps not a classic genre, this provided a good opportunity for the visually impaired user to identify with some of the more tactile, spatially expressive works, as well as being an elegant synopsis of ideas expressed in more intricate ways elsewhere. Wherever possible we tried to select paintings and sculptures owned by Tate, in order that visually impaired people in the UK had a better chance of visiting them. This would also go some way towards alleviating the copyright difficulties we faced.

The structure and functionality of i-Map had still only been explored tentatively at this stage, but these thematic pairings did at least provide a backbone to the project. Online visual art projects aimed at the visually impaired were virtually unprecedented, though we were offered a glimpse at a possible way forward by a Web site created by the Finnish National Gallery which explored the work of symbolist painter Hugo Simberg. The method they had used was to isolate and describe in turn various sections of a painting. By studying a section at a time, the visually impaired user was never overwhelmed by detail as they would have been if confronting the whole. They were able to accumulate detail at their own pace and arrive in their own time at an understanding of the complete image. In accessing these descriptions the user was offered a choice of text and audio. Obviously text, easily enlarged or accessed with screen reader software, was a

prerequisite of I-Map too. Audio was also discussed, and would indeed have provided a welcome alternative to the expressionless, synthesised drone of the screen reader. Unfortunately, budgetary restrictions eventually prevented us from including it, but it is very much planned as part of our next wave of iterations.

This Finnish example however, could only take us so far. Simberg's works are figurative and strongly narrative, so describing them was a relatively straightforward task. i-Map, on the other hand, was aiming to provide a critical engagement with works that were stylistically radical, non-narrative and requiring an understanding of art's conventions in order to discover their importance. If the work of Matisse and Picasso were to remain legible to the mind's eye, we would need to build into i-Map an ability to communicate the conceptual as well as the concrete, a strategy for text and image which moved beyond the literal descriptiveness of the Simberg site.

Drawing upon the touch tours, Caro was aware that one of the most successful methods of communicating complex pictorial concepts was the use of tactile diagrams, or raised images. These are essentially simple line drawings in which the line has been raised, by means of specialised equipment, to stand in relief against the surface in order to be touch-read. Caro had been developing sets of raised images in which components of the painting were isolated, as stand alone tactile objects, to be interpreted one at a time. Generally, once each element had been explored and understood, the user would be introduced to a raised image that brought these now familiar forms together, representing the artwork as a whole. Given the intentional contradictions and tactics of disorientation characteristic of much modern art, this final step could place heavy demands on the concentration. And yet as a challenging, often-ambiguous interaction it could, with careful guidance, become an equivalent to a sighted engagement with the artwork, and furthermore one in which certain key conceptual milestones would necessarily have been passed.

i-Map would make use of this approach in two ways. First, we would include sets of line drawings available as downloads from the site. Once printed and processed as raised images they could be used in conjunction with the text content of i-Map, extending beyond the hermetic confines of the computer screen to create a further tactile dimension. Secondly, the step-by-step use of raised images became the starting point for an animated component of the site. From a teaching point of view, Caro's method had relied on some all important acts of intervention: the deconstruction of the image into key areas, the emphasis or avoidance of certain details, the flow, over time, through different levels of understanding. Animation could offer a similarly selective, time-based movement through the artwork, which would be supported by text as the touch tours were supported by dialogue. Obviously, animation would be of no value to a blind user. But we were convinced that gentle transitions from one simplified element of an image to another could be an important tool for those with limited useful sight, and significantly, for those sighted people who's own understanding is crucial to the understanding of the blind people they assist.

Any Web site which cropped, dissected and animated the works of Matisse and Picasso was bound to overstep copyright restrictions by some distance, so we created a mock-up version of one work, Matisse's *The Moroccans* , that could be used to demonstrate our intentions to the artists' estates. To my mind, the result betrays the struggle to reconcile the unique demands of i-Map with the wealth of Web accessibility advice. The page is split into two frames. On the right, a text description of the work contains keywords and phrases, which, as JavaScript links, act as triggers to corresponding animated sequences in the frame on the left. The image section was built in Flash and fundamentally serves to pan and zoom in on relevant areas, mask peripheral detail and occasionally introduce diagrammatic elements to make explicit some of the more subtle structures at work in the painting. As such, the image of *The Moroccans* is virtually ever-present, but other than as a point of departure, is only ever revealed in its entirety at the end. Above the image itself, a control panel of sorts provides the user with sound-coded buttons to view the full image or to return to the main menu. A third symbol, a flashing M, appears at points in the sequence where a raised image is to be used (Minolta is a trade name for the raised images).

It is a design that tries to be all things to all users. For example, a blind person, reliant solely on text and raised images, would nonetheless have to contend with the distracting presence of the animation " and this, presumably, after having to download a Flash plug-in for which they had little use. Meanwhile, the user with some sight was expected to follow the text, the animation and the raised drawings simultaneously " a challenge even for a (fully sighted) person. Dan Porter was keen to keep the design uncluttered to give the user the best possible chance of seeing what was onscreen, but this would be impossible for as long as we tried to contain the whole project within the same interface. Perhaps somewhat surprisingly, it had also not occurred to us at this stage that a user that required noises to alert them to the presence of buttons would be highly unlikely to be operating a computer with a mouse. But the steep learning curve was steep, and, as in any design process, identifying these early faults would be prove crucial to the future development of the project. Furthermore, this prototype version of i-Map helped to convince the families of Matisse and Picasso of the integrity of the project, when we visited them in Paris to discuss copyright permission in February 2002.

Having been granted permission to proceed with i-Map, Dan was at a natural point at which to reassess the usability of the site. It also meant , we were now forced to think about i-Map in relation to the Tate Web site as a whole. Beginning with a typical page from the Tate site, Dan attempted to transform it from a Webpage accessible to blind and visually impaired users to one that was ideal. He did not have complete freedom to redevelop the page. He had to maintain some design continuity with the rest of the Tate site and the sponsor's logo was also obligatory, but in some ways these were helpful constraints. Having removed the search facility, an animated graphic and the bold strip of colour at the top of the page, a working version of the page was tested by Paul Porter, a blind Web expert at the RNIB. We asked him to list any obvious design faults but interestingly, this information proved difficult to extract. Paul tended to set acceptable rather than optimal usability at the top end of his scale, presumably a mindset of one accustomed to using products designed in the sighted world, and in particular to Web sites 'made accessible' post-design. However, text reader software is a fantastic tool for disclosing inconvenient or badly prioritised content. Unlike the trained eye, it cannot skip automatically to the most relevant content, and after hearing the synthesised voice recite Tate's standard navigation links a number of times, the decision to shift them from the top to the foot of the page was an obvious one. Testing with a screen reader also allowed me to realise, belatedly, that blind users relying only on text and raised images would be best served by pages devoted to that purpose. i-Map's themed pairs needed to be presented in two formats, text only and text and animation, and it was important that at the gateway to these sections we made the intended users explicit.

Meanwhile a pattern of working had emerged . We would begin by storyboarding a journey through the artwork, which would provide us with a sequential blueprint both for the animation and for a set of raised images. Given the range of artistic approaches within our four pairs, it would have been impossible to find a single methodology to produce a narrative for each. Where we thought a sense of the construction of the painting was important, like the Picasso still life or *Nude in an Armchair* 1932, we used a layer-by-layer approach. *The Moroccans* 1916, on the other hand, is a painting in which three very noticeably distinct areas of detail exist; we wanted to examine each of these areas in turn before discussing the spatial conflicts between them and the shapes and colours that gave them unity. So in this case it made more sense to begin with a circuit of the painting, selecting details to act as stepping-stones in a clockwise movement around the work. Our treatment of detail was in itself an important point of discussion. As is it was important that i-Map allowed a visually impaired person to reach the same level of understanding as any sighted person, we could not omit intricate or obscure detail if we deemed it significant to the overall interpretation. In both the animations and the raised images we would find ways of clarifying difficult-to-read areas without damaging integrity of the work, redrawing them in a bolder, simpler fashion, and making sure to state in the text that the artist intended an element of ambiguity. In our storyboarding sessions we were also careful that such attention to detail was not immediately followed by a much wider view, as dramatic leaps in scale would be likely to cause confusion.

Of course, these decisions had a significant impact on Dan's approach to the animation. While his first attempt had, quite literally, revolved around a single, electronic reproduction, it became clear that this could only ever allow us to work on the surface of the painting. For us, the artwork itself only represented the most detailed, final frame or the top layer in a sequence. If, using some creative license where necessary to complete outlines and forms, we could break the image down into a series of independent layers -each wholly legible in its own right- we could build up to a final image through a series of coherent, unobstructed steps. Just as the first raised drawings in a set needed to be intelligible independently of last, so the animation turned the image into a fully articulated object: made up of overlapping elements with the potential to be moved, developed and seen independently of each other. This approach was applied to all the works, but is perhaps best exemplified by Picasso's still life, *Bowl of Fruit, Violin and Bottle*, 1914. Though a painting, it is very much based upon Picasso's use of collage, itself a layer-upon-layer technique. So it seemed very appropriate to give the user the experience of building up the work by arranging cut-out elements on top of each other. The image builds piece by piece as the user hits the spacebar, while the use of sound acts as confirmation that they are affecting change.

Entirely recreating the works had the added advantage of enhancing their clarity. They were built in Flash rather than painted with oil on canvas, and so, for our purposes, they benefit from bolder colour and cleaner lines. There were other important changes from the prototype version. The simpler interface was now fully operable with a keyboard, although it remained possible to use mouse if preferred. And the relationship between the animation and the text had switched from being text-led to animation-led. Key points in the animation were now catalysts for changes in the text, rather than vice versa. Technically, this was a much more reliable method than the first, which, even in the prototype had been prone to faults and cross-platform difficulties.

The preliminary storyboarding involved detailed discussion between us and mutual clarification of the key points we wanted as the focus of each work and how they'd be revealed. So the final storyboard reflected the narrative structure of the text which Caro wrote in response to the completed animation. The text was passed between us for editing and improving, but you'll notice that its language, tone and flow is very different from anything else on the Tate's Web site and from most written interpretation one sees in a gallery. This is because in order for aural information to be absorbed, particularly when it's being spoken by a synthesised voice that lacks cadence and emphasis, sentence structures must be short and simple, information has to be delivered systematically and incrementally, and meaning has to be clear even when delivered in a monotonous deadpan voice. Moreover, using common written terms like 'the latter' or 'the previous point' only confuse because the ear cannot dart back over previous text to remind the listener what the latter point was. This commitment to clarity meant that i-Map's texts are very long, which goes against our instincts as curators and Web designers. However, visually impaired people are used to listening attentively and prefer detailed explanations to hasty summations that often fail to put them fully in the picture. The text only version is even longer because of course each raised drawing had to be introduced before it can be put to use in the service of the overall exploration of a work.

Obviously, in building a project specifically for visually impaired users, a Web designer would be foolish to ignore the now well-established tenets of Web accessibility, and we like to think we could claim to have complied with those. But we would also hope that i-Map illustrates the limited significance of that claim when providing Web access to visual art. In testing the site with blind users particularly, we saw confirmation of the fact that technical accessibility does not mean intellectual accessibility. Indeed, art museums are frequently reprimanded for forgetting to include ALT tags, for example, to identify an image. But in simply naming an image, a museum does little more than give the blind or visually impaired user an idea of what they are missing. In following accessibility guidelines alone, we do not provide access to artworks, but to information about them. And although as sighted people we are often barely aware of it, much of that information is deeply rooted in the visual experience. The Tate Web site, for

example, provides access to a vast range of texts and data about artworks and exhibitions, and a blind user should have no problems in navigating it. But the amount information coded in such a way as to include the visually impaired is minimal. It is obviously not feasible for a visual art Web site to author all its from a visually impaired perspective, though its arguably a good exercise for art history students. It is only through specialised provisions like i-Map that visual art on the Web can become truly accessible, so museums and galleries need the time and the resources to make these available.

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